

01-27-00

A

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)*(Only for new nonprovisional applications under 37 CFR 1.53(b))*Docket No.
14531.27.2.1

Total Pages in this Submission

TO THE ASSISTANT COMMISSIONER FOR PATENTSBox Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

SYSTEM AND METHOD FOR INTERCONNECTING COMPONENTS THAT EMPLOY EITHER COMPOSITE OR S-VIDEO SIGNALS

and invented by:

Douglas Alexander
Tim Bucher
Stephen G. Perlman**If a CONTINUATION APPLICATION**, check appropriate box and supply the requisite information:☐ Continuation ☐ Divisional ☒ Continuation-in-part (CIP) of prior application No.: 09/244,222

Which is a:

☐ Continuation ☐ Divisional ☒ Continuation-in-part (CIP) of prior application No.: 09/154,609

Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.:

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 33 pages and including the following:
 - a. ☒ Descriptive Title of the Invention
 - b. ☒ Cross References to Related Applications *(if applicable)*
 - c. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*
 - d. ☐ Reference to Microfiche Appendix *(if applicable)*
 - e. ☒ Background of the Invention
 - f. ☒ Brief Summary of the Invention
 - g. ☒ Brief Description of the Drawings *(if drawings filed)*
 - h. ☒ Detailed Description
 - i. ☒ Claim(s) as Classified Below
 - j. ☒ Abstract of the Disclosure

UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
14531.27.2.1

Total Pages in this Submission

Application Elements (Continued)

3. ☒ Drawing(s) (when necessary as prescribed by 35 USC 113)
- a. ☒ Formal Number of Sheets 8
- b. ☐ Informal Number of Sheets _____
4. ☒ Oath or Declaration
- a. ☒ Newly executed (original or copy) ☐ Unexecuted
- b. ☐ Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional application only)
- c. ☒ With Power of Attorney ☐ Without Power of Attorney
- d. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application,
see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (usable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Computer Program in Microfiche (Appendix)
7. ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all must be included)
- a. ☐ Paper Copy
- b. ☐ Computer Readable Copy (identical to computer copy)
- c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☒ Assignment Papers (cover sheet & document(s))
9. ☐ 37 CFR 3.73(B) Statement (when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement/PTO-1449 ☐ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Acknowledgment postcard
14. ☒ Certificate of Mailing
- ☐ First Class ☒ Express Mail (Specify Label No.): EL 400136450 US

UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
14531.27.2.1

Total Pages in this Submission

Accompanying Application Parts (Continued)

15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)


16. ☐ Additional Enclosures (please identify below):

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	31	- 20 =	11	x \$18.00	\$198.00
Indep. Claims	5	- 3 =	2	x \$78.00	\$156.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$690.00
OTHER FEE (specify purpose) Assignment Recordation Fee					\$40.00
TOTAL FILING FEE					\$1,084.00

- ☒ A check in the amount of \$1,084.00 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. 23 3178 as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of _____ as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).


Signature

R. Burns Israelsen
Attorney for Applicant
Registration No. 42,685
WORKMAN, NYDEGGER & SEELEY
1000 Eagle Gate Tower
60 East South Temple
Salt Lake City, Utah 84111
(801) 533-9800

Dated: January 24, 2000

cc:

CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10)Applicant(s): **Douglas Alexander, Tim Bucher, and Stephen G. Perlman**

Docket No.

14531.27.2.1

Serial No.

unassigned

Filing Date

January 24, 2000

Examiner

unassigned

Group Art Unit

unassigned

Invention: **SYSTEM AND METHOD FOR INTERCONNECTING COMPONENTS THAT EMPLOY
EITHER COMPOSITE OR S-VIDEO SIGNALS**I hereby certify that this correspondence listed as transmitted below*(Identify type of correspondence)*

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under
37 CFR 1.10 in an envelope addressed to: The Assistant Commissioner for Patents, Washington, D.C. 20231 on
January 24, 2000

*(Date)*Margaret Carlson*(Typed or Printed Name of Person Mailing Correspondence)**(Signature of Person Mailing Correspondence)*EL 400136450 US*("Express Mail" Mailing Label Number)***Note: Each paper must have its own certificate of mailing.**

TRANSMITTED: Patent Application (33 pgs); 8 Sheets of Formal Drawings; Transmittal
Letter in Duplicate (3 pgs); Assignment with Recordation Cover Sheet (4
pgs); Declaration, Power of Attorney, and Petition (3 pgs); Check No.
113495 for \$1,084.00; and postcard

UNITED STATES PATENT APPLICATION

of

DOUGLAS ALEXANDER

TIM BUCHER

STEPHEN G. PERLMAN

for

**SYSTEM AND METHOD FOR INTERCONNECTING COMPONENTS
THAT EMPLOY EITHER COMPOSITE OR S-VIDEO SIGNALS**

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

OFFICE OF THE ATTORNEY GENERAL

BACKGROUND OF THE INVENTION

1. Related Applications

This application is a continuation-in-part of U.S. Patent Application Serial No. 09/244,222, filed February 4, 1999, entitled "System and Method of Interconnecting and Using Components of Home Entertainment System," which is a continuation-in-part of U.S. Patent Application Serial No. 09/154,609, filed September 16, 1998, entitled "System for Enhanced Entertainment System Control." Both of the foregoing patent applications are incorporated herein by reference.

2. The Field of the Invention

The present invention relates to interconnecting and using a plurality of consumer electronic devices. More specifically, the present invention is directed to systems and methods that allow for the interconnection of consumer electronic devices that employ either composite or S-video signals, such as television sets, VCRs, stereo systems, video disk players, satellite receivers, cable boxes, video game players, and Internet terminal devices.

3. The Prior State of the Art

The television set has been a source of entertainment for individuals since its introduction and traditionally has been a fairly simple device for users to set up and connect. A user simply unboxed the television set, connected the antenna, plugged in the power cord and turned on the television set. Since the inception of television, other consumer electronic devices have been introduced that may be connected to a television set to create a home entertainment system. For instance, VCRs, videodisk players, and video game devices provide enhanced entertainment. Cable television services and satellite receivers along with

1 traditional broadcast antennas provide reception of video programming. Home theater
2 systems provide stereo and near theater quality audio. Internet terminals, such as WebTV®
3 boxes developed by WebTV Networks, Inc., of Palo Alto, California, allow consumers to
4 connect to the Internet and to send and receive information, using a television as the display
5 device. Using the foregoing consumer electronic devices or others in combination with a
6 television, consumers can now select and configure a wide variety of home entertainment
7 systems.

8 Although many consumer electronic devices are available, connecting and using
9 multiple devices in a home entertainment system can be extremely difficult and frustrating,
10 particularly when the devices employ different signaling formats. The interconnection is
11 further complicated because each of the various signaling formats requires its own type of
12 connectors, such as RCA-type connectors, S-video connectors, and so forth. The connectors
13 have traditionally connected the devices within a home entertainment system through the
14 use of either a cable with RCA-type connectors attached or a cable with S-video connectors
15 on both ends. The interconnection becomes complicated when a user desires to connect
16 devices where one device has RCA-type connectors for transmitting composite signals, and
17 the other device has an S-video connector for transmitting S-video signals.

18 It would, therefore, be an advancement in the art to simplify the method of
19 connecting consumer electronic devices within a home entertainment system. It would also
20 be an advancement in the art to provide a technique that would allow for the transmission of
21 either composite or S-video signaling on the same connecting device. Further, it would be
22 an advancement in the art if the connecting device could work with all types of consumer
23 electronic devices. Such advancements would increase the ease of use of consumer
24 electronic devices and would enable users to experience the full functionality of the devices.

SUMMARY OF THE INVENTION

The present invention relates to systems and methods for use in inter-device connectivity within an entertainment system that allow for switching between composite video and S-video formats. More specifically, the systems and methods support left audio, right audio, and can be selectively adapted to support either composite video or S-video. The systems and methods provide increased ease and flexibility, and improved interoperability of components within an entertainment system.

In one implementation of the invention, a system includes a cable with a left audio connector, a right audio connector, a male S-video connector and a mini plug. An adapter that has a male RCA end and a female S-video end is available for mating with the male S-video connector of the cable to allow for selective switching between S-video and composite video by employing a two-pin shortage. Thus, through the use of the adapter, the connector system is compatible with both the S-video and composite video formats.

Implementation of the invention eliminates the need for the user of the entertainment system to understand the specific requirements for connecting various consumer electronic devices together. Instead, the user must merely identify on the consumer electronic device whether an RCA-type connector or an S-video connector is required for connection. The identification is facilitated by the appearance of the two types of connectors being different. If an S-video end is required, the S-video male connector is inserted into the S-video female connector of the consumer electronic device. If an RCA-type connector is required, the S-video male connector is mated with the S-video end of the adapter, and the RCA male end of the adapter is connected to the RCA female connector of the consumer electronic device.

1 In the embodiment of the invention referred to above, the mini plug of the connector
2 system has the same size shaft as a standard mini plug, but with an increased number of
3 contact points. A receptacle within an electronic device mates with the mini plug. The
4 receptacle contains at least one contact point that is used for ground sensing in order for the
5 accompanying software to detect which devices are connected in the entertainment system.

6 Additional features and advantages of the invention will be set forth in the
7 description that follows, and in part will be obvious from the description, or may be learned
8 by the practice of the invention. The features and advantages of the invention may be
9 realized and obtained by the means and combinations particularly pointed out in the
10 appended claims. These and other features of the present invention will become more fully
11 apparent from the following description and appended claims, or may be learned by the
12 practice of the invention as set forth hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the manner in which the above recited and other advantages and objects of the invention are obtained, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments thereof that are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Figure 1 is an illustration of an embodiment having a cable with a left audio connector, a right audio connector, a male S-video connector, a mini plug and an adapter that has a male RCA end and a female S-video end.

Figure 2 is an illustration of an embodiment of an adapter that has a male RCA end and a female S-video end.

Figure 3 is an illustration of an embodiment where the male S-video connector attached to the cable is mated with the female S-video end of the adapter, thereby effectively creating a male RCA connector.

Figure 4 is an illustration of a mini plug that has the same size shaft as a standard mini plug, but with an increased number of contact points.

Figure 5 is an illustration of a stacked dual receptacle that can be embedded in a consumer electronic device for mating with a mini plug.

Figure 6 is a schematic diagram demonstrating the mating of a receptacle, embedded in a consumer electronic device, with a mini plug, and further illustrates an embodiment where components of a central electronic device are used for sensing whether or not a proper

1 connection has been made, the cable type connected thereto, and the format of the electrical
2 signaling.

3 Figure 7 is a schematic diagram that illustrates an example of an environment
4 wherein an embodiment of the present invention can be implemented, namely a home
5 entertainment system in a hub and spoke configuration.

6 Figure 8 illustrates a back panel of a central electronic device according to one
7 embodiment of the invention, illustrating a plurality of identical, interchangeable jacks.

8 Figure 9 is a schematic diagram depicting a home entertainment system in a hub and
9 spoke configuration, illustrating the use of jacks for sending signals into and out of a central
10 electronic device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to systems and methods for interconnecting consumer electronic devices in a home entertainment system to allow for switching between composite video and S-video formats. The invention further extends to systems and methods that support left audio, right audio, and can be selectively adapted to support either composite video or S-video. According to one embodiment of the invention, a mini plug is included that has the same size shaft as a standard mini plug, but with an increased number of contact points. According to another embodiment, detection takes place as to which devices are connected in the home entertainment system. The systems and methods provide increased ease and flexibility, and improved interoperability of components in the home entertainment system.

The invention will be described through the use of diagrams to illustrate either the structure or processing of embodiments used to implement the systems and methods of the present invention. Using the diagrams in this manner to present the invention should not be construed as limiting its scope.

The invention will be described in reference to consumer electronic devices included in a home entertainment system. In this context, "consumer electronic device" or "electronic device" is used to refer to any number or type of various consumer electronic devices that provide audio output, video output, or information services or can be connected to a television set. Such devices include, but are not limited to, cable boxes, satellite receivers, video cassette recorders (VCRs), video game consoles, video disk players, home theater equipment, home stereo equipment, Internet terminals, personal computers, and television sets. "Home entertainment system" refers to a system that includes one or more

1 consumer electronic devices and provides audio and/or video output to a user and is not
2 limited to those that are used in residential buildings.

3
4 **I. Connector Systems**

5 Referring now to Figure 1, an embodiment is depicted generally as connector system
6 100 that includes mini plug 110 connected to cable 120, which is in turn connected to RCA
7 connector 130, RCA connector 140, S-video connector 150, and adapter 160. Strain relief
8 structure 170 is included to provide support to cable 120 and to prevent shearing or other
9 deterioration of the electrical conductors within cable 120. In one embodiment, male mini
10 plug shaft 112 of mini plug 110 has the same length and diameter as a standard male mini
11 plug shaft. However, male mini plug shaft 112 has an increased number of contact points to
12 enable the passage of either composite or S-video signals, as will be further explained
13 below.

14 Cable 120 is any type of means for conducting electrical signals capable of being
15 attached to connectors such as a mini plug, an RCA connector, and/or an S-video connector,
16 thereby allowing audio and/or video signals to be conducted through the cable. By way of
17 example, such means for conducting can include any suitable metallic conductors such as
18 copper, nickel, silver, and so forth, surrounded by an insulator to allow for directed
19 transmission of a signal.

20 RCA connectors 130 and 140 respectively support left audio and right audio when an
21 RCA format is employed, as shall be further explained below. Male shafts 132 and 142 can
22 be mated with female RCA connectors of an consumer electronic device or another cable
23 system to provide a coupling with connector system 100 whereby a signal can be transmitted
24 through the coupling.

1 S-video connector 150 supports audio and video signals when an S-video format is
2 employed. Male S-video connector 152 can be mated with a female S-video connector of a
3 consumer electronic device or another cable system to provide a coupling with connector
4 system 100 whereby audio and video signals can be transmitted through the coupling.

5 Adapter 160 contains male RCA end 162 and female S-video end 164 and can be
6 mated with S-video connector 150 to provide an equivalent RCA connector to support video
7 signals when an RCA video format is employed. In one embodiment, adapter 160 is made
8 available for mating with male S-video connector 152 by being attached to S-video
9 connector 150 or cable 120. In one embodiment, and as illustrated in Figure 1, means 166
10 for attaching adapter 160 to S-video connector 150 is employed. By way of example, means
11 166 can be any means for attaching adapter 160 to S-video connector 150 in order that
12 adapter 160 is available to be coupled with S-video connector 150 when a composite signal
13 is employed. By way of example, Figure 1 illustrates attaching means 166 as a plastic
14 thread. No signal is required to be transmitted through attaching means 166.

15 As mentioned above, connector system 100 is capable of conducting audio signals
16 and video signals between electronic devices, regardless of whether the signals are in a
17 composite or S-video format. Connector system 100 can also be used as a means for
18 conducting only audio signals or only video signals. As explained above, the video signal
19 can be in either a composite or S-video format.

20 Referring to Figure 2, adapter 160 is illustrated to highlight female S-video end 164
21 having sockets 210 whereby corresponding pins on male S-video connector 152 are inserted
22 to provide a connection between S-video connector 150 and adapter 160. The four sockets
23 210 and corresponding four pins on male S-video connector 152 are dedicated for the
24 transmission of left audio, right audio, chroma, and luma. In order to assist a user in making

1 a proper connection, in one embodiment symbols are placed on S-video connector 150 and
2 adapter 160 in such a way as to allow for a proper alignment in the connection between S-
3 video connector 150 and adapter 160. For example, adapter 160 has formed thereon an
4 arrow 200 that matches a corresponding arrow 300 on S-video connector 150 as illustrated
5 in Figure 3 to assist the user in making a proper connection.

6 The combination of S-video connector 150 and adapter 160 provides an equivalent
7 male RCA connector to support video signals when an RCA video format is employed.
8 Upon the connection of S-video connector 150 with adapter 160, male RCA end 162 can be
9 coupled with a female RCA connector of a consumer electronic device or another cable
10 system so as to enable composite video signals to be transmitted through cable 120.

11 A consumer electronic device connected to mini plug 110 can be notified that
12 adapter 160 is coupled with S-video connector 150 to allow for the transmission of a
13 composite signal. By way of example, differential amplifiers or impedance sensors can
14 detect which of the male pins on male S-video connector 150 are employed for transmitting
15 a signal, can determine if the signal is in a composite or S-video format, and thus whether or
16 not adapter 160 is coupled with S-video connector 150. The result obtained can then be
17 transmitted to the consumer electronic device that is connected to mini plug 110 to notify the
18 device as to whether or not adapter 160 is being employed.

19 When S-video connector 150 is mated with adapter 160 in preparation for
20 conducting a composite signal, a two-pin shortage is established at the S-video connector.
21 Based on the presence or absence of this two-pin shortage, the electronic device coupled to
22 mini plug 110 can determine whether connector system 100 has been adapted to conduct
23 composite or S-video signals. Based on this determination, the electronic device can infer
24 which type of signal the electronic device connected to the opposite end of connector system

1 100 supports and, consequently, which type of signal is to be used to communicate with the
2 opposite electronic device.

3 In one embodiment, measuring the impedance of the male pins of male S-video
4 connector 152 provides a determination as to whether there is a two-pin shortage in S-video
5 connector 150. As mentioned above, and by way of example, differential amplifiers or
6 impedance sensors can be used to perform the measurement. As such, a differential
7 amplifier can operate to detect a difference in voltage and serves as a comparator. The
8 resultant voltage from the differential amplifier can inform a software component that
9 adapter 160 is attached, resulting in a switch to the use of composite video signaling. In one
10 embodiment, the resultant voltage is transmitted through the connector system to a computer
11 chip located in central electronic device. The chip recognizes the change of impedance and
12 switches over from an S-video format to a composite video format.

13 Because the two-pin shortage is performed automatically, all that the user must do is
14 visually recognize whether a consumer electronic device requires an S-video connection or
15 an RCA connection. S-video connectors and RCA connectors being visually different
16 facilitate user recognition. If an S-video connection is required, then S-video connector 150
17 is used to provide the connection. If an RCA connection is required, then S-video connector
18 150 and adapter 160 are mated to provide an equivalent RCA connector that combines the
19 chroma and the luma in order to support composite video signaling.

20 When adapter 160 is not coupled with S-video connector 150, RCA connectors 130
21 and 140 are not used since S-video connector 150 supports both audio and video signals.
22 However, when adapter 160 is coupled with S-video connector 150, RCA connectors 130
23 and 140 are employed for supporting left and right audio. In either case, mini plug 110
24 continues to support left audio, right audio, video, and ground.

1 In view of the foregoing, adapter 160, S-video connector 150, and RCA connectors
2 130 and 140 represent one example of structure that corresponds to means for selectively
3 adapting the interconnection system for use with either a composite video signal format or
4 an S-video signal format. In general, the means for selectively adapting the interconnection
5 system in this way extends to any other connectors that are attached to the ends of the
6 plurality of electrical conductors in cable 120 opposite mini plug 110 in a manner such that
7 i) the single cable system can be used for both composite and S-video signals and ii) at least
8 some of the individual electrical conductors can be used at different times with electrical
9 signals formatted according to the composite signal format and the S-video signal format.

10 Figure 4 is an illustration of mini plug 110 having mini plug shaft 112 that provides
11 an increased number of contact points on the same size shaft as a standard mini plug shaft.
12 In one embodiment, mini plug shaft 112 includes five contact points 410a-e. The five
13 contact points are for left audio, right audio, video chroma, video luma, and ground. In one
14 embodiment, the end contact point 410a is used for left audio and the third contact point
15 410c is used for right audio. When S-video signaling is being transmitted, all five contact
16 points 410a-e are in use. When composite signaling is being transmitted, the contact points
17 for left audio, right audio, and ground and one video contact point are used since adapter
18 160 combines the video chroma and luma for composite signaling. Therefore, a single
19 connector, such as mini plug 110, can be used for left and right audio and composite or S-
20 video signals.

21 Figure 5 illustrates receptacle 500 that can be embedded in a consumer electronic
22 device for mating with mini plug 110. In one embodiment, and as illustrated in Figure 5,
23 receptacle 500 is a dual stacked receptacle capable of supporting both upper and lower
24 applications. As such, one of sockets 510 or 520 is dedicated for signals transmitted into

1 receptacle 500 and the other socket is dedicated for signals transmitted out of receptacle 500.
2 Moreover, receptacle 500 is said to be a dual stacked receptacle because of the presence of
3 adjacent sockets 510 and 520. Mini plug 110 can be mated with either socket 510 or 520.

4 In one embodiment, receptacle 500 provides a contact point for connection with each
5 of the five contact points 410a-e of Figure 4, and one or more contact points for ground
6 sensing. The contact points used for ground sensing recognize a physical displacement as a
7 result of inserting mini plug 110, and notify a software component that mini plug 110 is
8 inserted. Thus, the accompanying software can detect which devices are connected in a
9 home entertainment system, as shall be further explained below. Pins 530 provide an
10 electrical contact between receptacle 500 and the electrical components of the consumer
11 electronic device of which receptacle 800 is embedded.
12

13 **II. Determination of Connection Properties**

14 Referring now to Figure 6, an embodiment is illustrated in which receptacle 500 can
15 be embedded into a consumer electronic device and made available for mating with mini
16 plug 110. In this embodiment receptacle 500 is embedded in central electronic device 610.
17 In the embodiment of Figure 6, central electronic device 610 includes hardware and/or
18 computer-executable instructions for determining that a consumer electronic device is
19 connected, the type of device that is connected, and the type of signal format that is being
20 employed in the transmission. More specifically, central electronic device 610 includes
21 cable type sensor 620, signal format module 630 and ground sensor 640.

22 When a contact point of receptacle 500 that is dedicated for ground sensing comes in
23 contact with male mini plug shaft 112, ground sensor 640 is notified of the connection of
24 mini plug 110 with central electronic device 610. As such, ground sensor 640 is used to

1 recognize whether a proper connection has taken place between mini plug 110 and
2 receptacle 500. Furthermore, ground sensor 640 can notify a user as to whether the
3 connection is or is not proper. By way of example, the notification can take place either by
4 utilizing hardware and/or software to illuminate a light, send an audio message or flash a
5 message on a monitor notifying that the connection is proper, or in any other desired
6 manner. The computer-executable instructions used to notify the user of a proper
7 connection can be executed by a processor and can be contained in ROM, flash memory,
8 and/or RAM.

9 In one embodiment, when the user connects mini plug 110 to receptacle 500, cable
10 type sensor 620 determines whether cable 120 is an audio-video (AV) cable or an audio-
11 only cable. For example, if cable 120 is connected to a digital satellite system (DSS)
12 receiver, cable type sensor 620 determines that cable 120 is an AV cable. Cable type sensor
13 630 then determines whether the cable is an input or output cable with respect to the
14 consumer electronic device by determining whether there is an audio or video signal on the
15 cable. For example, if the user has connected a DSS receiver to central electronic device
16 610, cable type sensor 620 will determine that cable 120 is an AV output cable associated
17 with a consumer electronic device.

18 When cable type sensor 620 has characterized cable 120 as AV or audio-only and as
19 an input or output cable, the cable type sensor may need additional information to identify
20 the consumer electronic device associated with cable 120. If so, central electronic device
21 610 can prompt the user to input the type of consumer electronic device. The prompt can
22 be, for example, the display of a question or menu choice on a television set connected to
23 central electronic device 610. Although identifying the consumer electronic device may
24 require some user input, it does not require the user to understand whether cable 120 is AV

1 or audio-only or whether it is an input or output cable. In view of the foregoing, cable type
2 sensor 620 represents one example of means for identifying the type of signals that are
3 compatible with the consumer electronic devices connected to central electronic device 610.

4 In some instances, cable type sensor 620 can also deduce the identity of the
5 consumer electronic device connected to cable 120 using the signals carried on cable 120
6 and conductivity properties of the cable. For instance, cable type sensor 620 can determine
7 whether the cable conducts only in one direction or measure the impedance of the jack to
8 determine if the cable is connected to a microphone or is an audio connector.

9 Cable type sensor 620 can also determine whether the connected cable carries a
10 composite or S-video signal. As mentioned above, cable 120 is supplemented with S-video-
11 to-RCA video adapter 160, illustrated in Figures 1-3, which allows cable 120 to be used with
12 televisions or other consumer electronic devices having either a composite or S-video
13 format. Notably, mini plug 110 of cable 120 that connects to the central electronic device
14 610 of Figure 6 is the same whether cable 120 is used with S-video or composite signals.
15 Thus, the user inserts mini plug 110 into receptacle 500 of central electronic device 610 and
16 when the consumer electronic device to be connected does not have an S-video connector, or
17 when the user desires to use the RCA video input, adapter 160 is coupled to the end of S-
18 video connector 150, as illustrated above in Figure 3. When cable 120 is instead to be used
19 with an S-video format, adapter 160 remains unconnected to S-video connector 150. In this
20 case, S-video connector 150 is coupled with the corresponding S-video connector of the
21 television.

22 Connector system 100 can therefore be used to connect a consumer electronic device
23 to a home entertainment system without the user understanding the significance of the
24 difference between S-video and RCA connections. The user merely selects a receptacle on

1 central electronic device 610 and S-video connector 150 with or without adapter 160. Cable
2 type sensor 620 can determine whether cable 120 is being used with or with out adapter 160
3 through the use of a two pin shortage, as explained above, and can determine the type of
4 signal that is transmitted through cable 120 and thus how cable 120 is being used. If adapter
5 160 is used, cable type sensor 620 concludes that cable 120 is being used as an RCA cable.
6 Otherwise, cable type sensor 620 concludes that cable 120 is being used as an S-video cable.
7

8 **III. Exemplary Home Entertainment System Environment**

9 The connector systems of the invention can be used to conveniently interconnect
10 electronic devices arranged in the hub and spoke configuration. The connector systems can
11 also be used to interconnect electronic devices having any other desired topology. By way
12 of example, the connector system of the invention can be used to interconnect one consumer
13 electronic device, such as a video camera, with another consumer electronic device, such as
14 a television. In this example, receptacle 500 can be embedded in the video camera for
15 connecting to mini plug 110 and RCA connector 130, and RCA connector 140, and adapter
16 160 coupled with S-video connector 150 can be connected to the television when a
17 composite signal format is employed or S-video connector 150 can be connected to the
18 television when an S-video signal format is used.

19 Figures 7-9 will be used to illustrate an environment in which an embodiment of the
20 present invention is used to conveniently interconnect electronic devices of home
21 entertainment systems that are arranged in a hub and spoke configuration. The environment
22 is further detailed in U.S. Patent Application Serial No. 09/244,222, entitled "System and
23 Method for Interconnecting and Using Components of Home Entertainment System,"
24 incorporated herein by reference.

1 Referring first to Figure 7, a home entertainment system, illustrated generally as
2 entertainment system 700, has a variety of electronic devices connected to a central
3 electronic device in a hub and spoke configuration. More specifically, home entertainment
4 system 700 includes central electronic device 610 connected to cable box 720, VCR 730,
5 television 740, consumer electronic device 750, consumer electronic device 760, and cable
6 jack 770. In the hub and spoke configuration, all signals pass through, are received by, or
7 are transmitted by central electronic device 610. Accordingly, central electronic device 610
8 can control, manage, process, reformat, route, or otherwise respond to any signal
9 transmitted, generated, or received by any of the electronic devices connected to central
10 electronic device 610. In one example, central electronic device is a WebTV box that has
11 been modified to function as a central device in a hub and spoke configuration.

12 The hub and spoke configuration of the invention greatly simplifies the process of
13 connecting components of a home entertainment system, maintaining the connections, and
14 adding new electronic devices. A home entertainment system configured according to the
15 hub and spoke configuration of Figure 7 can have as few as two components (e.g., central
16 electronic device 610 and television 740) or as many components as can be attached to
17 central electronic device 610.

18 Figure 8 illustrates one example of the many types of consumer electronic devices
19 that can receive the mini plug of the connector systems of the invention. The back panel of
20 central electronic device 610 includes means for connecting each of a plurality of electronic
21 devices to the central electronic device in a hub and spoke configuration. Jacks 810
22 represent one example of such means. Each of jacks 810 is an identical connector that can
23 be used to connect any of the plurality of consumer electronic devices to central electronic
24 device 610 using the connector systems of the invention as explained above. Moreover,

1 jacks 810 are interchangeable, and the user generally does not need to know any special
2 connection techniques for the various consumer electronic devices other than connecting
3 them to any desired jack 810.

4 Unlike the separate RCA-type, S-video, and other connectors typically found in
5 conventional electronic devices, jacks 810 can be used to transmit or receive any of a variety
6 of video, audio, or data signals from the consumer electronic devices. For instance, any
7 particular jack 810 can function with stereo or mono audio signals, S-video signals, or RCA
8 signals. This capability enables central electronic device 610 to conveniently interconnect
9 cable boxes, satellite receivers, video tape recorders, video game consoles, video disk
10 players, home theater equipment, home stereo equipment, television sets, and other
11 consumer electronic devices without the user having to understand the different cables and
12 connection techniques that have been conventionally used in home entertainment systems.

13 The number of jacks 810 can be enough to provide input to or output from each of
14 the other consumer electronic devices included in the home entertainment system. While
15 ten to twelve jacks are often enough to support a reasonably complex home entertainment
16 system, the number may be greater or smaller depending on the number of consumer
17 electronic devices desired as components of a home entertainment system.

18 The connection of a new electronic device to central electronic device 610 merely
19 requires the user to connect the new device to one of the identical jacks 810 of Figure 8.
20 The task of connecting a new consumer electronic device to central electronic device 610 is
21 basically the same, regardless of whether the new consumer electronic device is a video
22 game console, stereo equipment, digital versatile disk players (DVDs) or the like. Thus, the
23 user generally does not need to know any special requirements for connecting the new
24

1 consumer electronic device. Furthermore, the existing devices, previously connected in the
2 home entertainment system, do not need to be repositioned, reconfigured, or removed.

3 Central electronic device 610 further includes AC power input 820, phone jack 830
4 (to support the optional Internet access or other information services), and optionally
5 universal serial bus (USB) port 840 and digital terrestrial antenna 850. Coaxial cable input
6 860 receives cable television signals from a cable provider.

7 Referring now to Figure 9, a home entertainment system, illustrated generally as
8 home entertainment system 900, includes central electronic device 610 connected to cable
9 box 720, VCR 730, television 740, cable jack 770 and also connected to DSS 910, DVD
10 920, stereo 930, and video game 940. The electronic devices are connected to central
11 electronic device 610 through jacks 810. As illustrated in Figure 9, some of jacks 810 are
12 used to send signals into central electronic device 610 while other jacks 810 are used to send
13 signals out of central electronic device 610. In one embodiment, jacks 810 are labeled as
14 “in” or “out” in order to facilitate the connection of the consumer devices. In another
15 embodiment, intelligent switching in the software of central electronic device 610 takes
16 place to identify whether a signal is sent in or out of a particular jack, as was explained
17 above in correlation with Figure 6.

18 As explained above, the present invention relates to systems and methods for use in
19 inter-device connectivity and allow for switching between composite video and S-video
20 formats. The present invention may be embodied in other specific forms without departing
21 from its spirit or essential characteristics. The described embodiments are to be considered
22 in all respects only as illustrative and not restrictive. The scope of the invention is,
23 therefore, indicated by the appended claims rather than by the foregoing description. All
24

1 changes that come within the meaning and range of equivalency of the claims are to be
2 embraced within their scope.

3 What is claimed and desired to be secured by United States Letters Patent is:
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

1 1. An interconnection system for interconnecting a first electronic device to a
2 second electronic device, both electronic devices utilizing audio and video signals, the
3 interconnection system comprising:

4 a plurality of electrical conductors for interconnecting the first electronic
5 device and the second electronic device, each of the plurality of electrical conductors
6 having a first end and a second end;

7 one or more audio connectors, each being attached to the first end of one of
8 the electrical conductors of the plurality of electrical conductors; and

9 a video connector attached to the first end of each of a subset of the plurality
10 of electrical conductors, the video connector being selectively adaptable for use with
11 either a composite signal format or an S-video signal format such that the
12 interconnection system is selectively usable with either the composite signal format
13 or the S-video signal format.

14
15 2. An interconnection system as recited in claim 1, wherein the video connector
16 comprises a male S-video connector for use with the S-video signal format.

17
18 3. An interconnection system as recited in claim 2, wherein the video connector
19 further includes an adapter having a female S-video end that can be selectively coupled with
20 the male S-video connector of the video connector and a male RCA end opposite the female
21 S-video end for supporting the composite signal format, wherein the video connector
22 supports the composite video signal format when the adapter is coupled with the male S-
23 video connector.

1 4. An interconnection system as recited in claim 1, wherein the one or more
2 audio connectors comprises a left audio connector and a right audio connector that are
3 capable of transmitting audio signals between the first electronic device and the second
4 electronic device when the interconnection system is used with the composite video format..
5

6 5. An interconnection system as recited in claim 4, wherein the video connector
7 comprises an S-video connector including an S-video audio connector, the S-video audio
8 connector, rather than the left audio connector and the right audio connector, being used to
9 transmit audio signals when the interconnection system is used with the S-video format.
10

11 6. An interconnection system as recited in claim 1, further comprising a mini
12 plug attached to both the second end of said one of the plurality of electrical conductors and
13 the second end of each of said subset of the plurality of electrical conductors, the mini plug
14 having a plurality of contact points.
15

16 7. An interconnection system as recited in claim 6, wherein the plurality of
17 contact points include a first contact point for transmitting left audio signals, a second
18 contact point for transmitting right audio signals, a third contact point for transmitting video
19 chroma signals and a fourth contact point for transmitting video luma signals.
20

21 8. An interconnection system as recited in claim 7, wherein the plurality of
22 contact points further includes a fifth contact point for ground.
23
24

1 9. An interconnection system as recited in claim 6, wherein the video connector
2 comprises a male S-video connector for use with the S-video signal format.

3
4 10. An interconnection system as recited in claim 9, wherein the video connector
5 further includes an adapter having a female S-video end that can be selectively coupled with
6 the male S-video connector of the video connector and a male RCA end opposite the female
7 S-video end for supporting the composite signal format, wherein the video connector
8 supports the composite video signal format when the adapter is coupled with the male S-
9 video connector.

13. An interconnection system as recited in claim 12, wherein the plurality of contact points further includes a fifth contact point for ground.

1 14. An interconnection system as recited in claim 11, wherein the means for
2 selectively adapting the interconnection system comprises:

3 one or more audio connectors, each being attached to the second end of one
4 of the electrical conductors of the plurality of electrical conductors; and

5 a video connector attached to the second end of each of a subset of the
6 plurality of electrical conductors, the video connector being selectively adaptable for
7 use with either a composite signal format or an S-video signal format such that the
8 interconnection system is selectively usable with either the composite signal format
9 or the S-video signal format.

10
11 15. An interconnection system as recited in claim 11, further comprising a mini
12 plug receptacle included in the first electronic device, the mini plug receptacle enabling the
13 mini plug end to be connected to the first electronic device.

1 16. In a system that includes at least a first electronic device and a second
2 electronic device, a method for communicating signals between the first electronic device
3 and the second electronic device using either a composite signal format or an S-video signal
4 format, the method comprising the steps of:

5 connecting the first electronic device with the second electronic device with
6 an interconnection system that is selectively adaptable to transmit signals using
7 either a composite video signal or an S-video signals, the interconnection system,
8 when connecting the first electronic device with the second electronic device, being
9 adapted to transmit the signal using a particular signal format selected from the
10 composite video signal format and the S-video signal format;

11 at the first electronic device, determining whether the particular signal format
12 is the composite signal format or the S-video signal format; and

13 based on the determination made in the determining step, communicating
14 between the first electronic device and the second electronic device using the
15 particular signal format.

16
17 17. A method as recited in claim 16, wherein the interconnection system
18 comprises:

19 a plurality of electrical conductors;

20 a mini plug for connecting the plurality of electrical conductors to the first
21 electronic device; and

22 at least one an audio connector and at least one video connector for
23 connecting the plurality of electrical conductors to the second electronic device,
24

1 wherein the second electronic device utilizes one of a composite signal format and an
2 S-video signal format.

3
4 18. A method as recited in claim 17, wherein at least one video connector
5 comprises a male S-video connector having a plurality of pins, and wherein the
6 interconnection system further includes an adapter for use when the particular signal format
7 is the composite signal format, the adapter having a female S-video end for mating with the
8 male S-video connector and a male RCA end opposite the female S-video end for
9 connecting the plurality of electrical conductors to the second electronic device.

10
11 19. A method as recited in claim 18, wherein two of the plurality of pins of the
12 male S-video connector are shorted when the male S-video connector is mated with the
13 female S-video end.

14
15 20. A method as recited in claim 18, wherein the step of determining comprises
16 the step of measuring the impedance of associated with selected electrical connectors of the
17 plurality of electrical connectors.

18
19 21. A method as recited in claim 20, wherein the step of measuring the
20 impedance is conducted using a differential amplifier.

21
22 22. A method as recited in claim 20, wherein the step of measuring the
23 impedance is conducted using an impedance sensor.

1 23. A method as recited in claim 17, further comprising the step of recognizing,
2 by the first electronic device, that the mini plug has been inserted into a receptacle at the
3 first electronic device, the step of recognizing further comprising the step of sensing a
4 physical displacement of a component of the receptacle as the mini plug is inserted into the
5 receptacle.

6
7 24. A method as recited in claim 17, further comprising the step of determining,
8 at the first electronic device, whether the signal is transmitted into or out of the second
9 electronic device.

1 25. A system for connecting a first electronic device to a second electronic
2 device and for transmitting signals between the first electronic device and the second
3 electronic device, the system comprising:

4 an interconnection system including:

5 a mini plug at a first end of the interconnection system and having a
6 plurality of contact points, wherein the mini plug can be connected to the first
7 electronic device; and

8 a plurality of electrical conductors for interconnecting the first
9 electronic device and the second electronic device, each of the plurality of
10 electrical conductors having a first end and a second end, wherein the first
11 end of each of the plurality of electrical conductors is connected to one of the
12 contact points of the mini plug; and

13 means for selectively adapting the interconnection system for use with
14 either a composite video signal format or an S-video signal format, the means
15 for selectively adapting the interconnection system being connected to the
16 second end of at least some of the plurality of electrical conductors; and

17 a receptacle that is included in the first electronic device and can couple with
18 the mini plug.

19
20 26. A system as recited in claim 25, wherein when the receptacle is coupled with
21 the mini plug, each of the plurality of contact points of the mini plug being in electrical
22 contact with one of a plurality of contact points of the socket.

1 27. A system as recited in claim 26, wherein the receptacle includes another
2 contact point, in addition to the plurality of contact points of the receptacle, the additional
3 contact point being capable of ground sensing.
4

5 28. A system as recited in claim 25, wherein one of the plurality of contact points
6 of the mini plug is for video chroma and another of the plurality of contact points of the mini
7 plug is for video luma.
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

1 29. In a home entertainment system that includes a plurality of electronic devices
2 and utilizes audio and video signals, a method for transmitting either composite or S-video
3 signals through an interconnection system, the method comprising the steps of:

4 coupling a mini plug positioned at a first end of the interconnection system to
5 a first electronic device so as to enable the transmission of audio and video signals
6 between the interconnection system and the first electronic device; and

7 coupling a connector positioned at a second, opposite end of the
8 interconnection system to a second consumer electronic device so as to enable the
9 transmission of the audio and video signals between the interconnection system and
10 the second electronic device, wherein the connector is selectively adaptable to be
11 used to transmit the audio and video signals in either a composite signal format or an
12 S-video signal format.

13
14 30. A method as recited in claim 29, wherein the connector includes an S-video
15 connector when the audio and video signals are to be transmitted between the
16 interconnection system and the second electronic device in the S-video signal format.

17
18 31. A method as recited in claim 29, wherein the connector includes an S-video
19 connector having a plurality of pins coupled with an adapter when the audio and video
20 signals are to be transmitted in the composite signal format, the adapter comprising:

21 an RCA end that mates with the second consumer electronic device; and

22 an S-video end that mates with the S-video connector, wherein two of the
23 plurality of pins of the S-video connector are shorted when the S-video end is mated
24 with the S-video connector.

ABSTRACT OF THE DISCLOSURE

Systems and methods for use in interconnecting consumer electronic devices in an entertainment system that allow for switching between composite video and S-video formats. The systems and methods support left audio, right audio, and can be selectively adapted to support either composite video or S-video signal formats. The systems and methods further allow for a determination that a consumer electronic device is connected, the type of device that is connected, and the type of signal format that is being utilized for the transmission.

G:\DATA\PAT\WORDPAT\14531 27.2.1.DOC

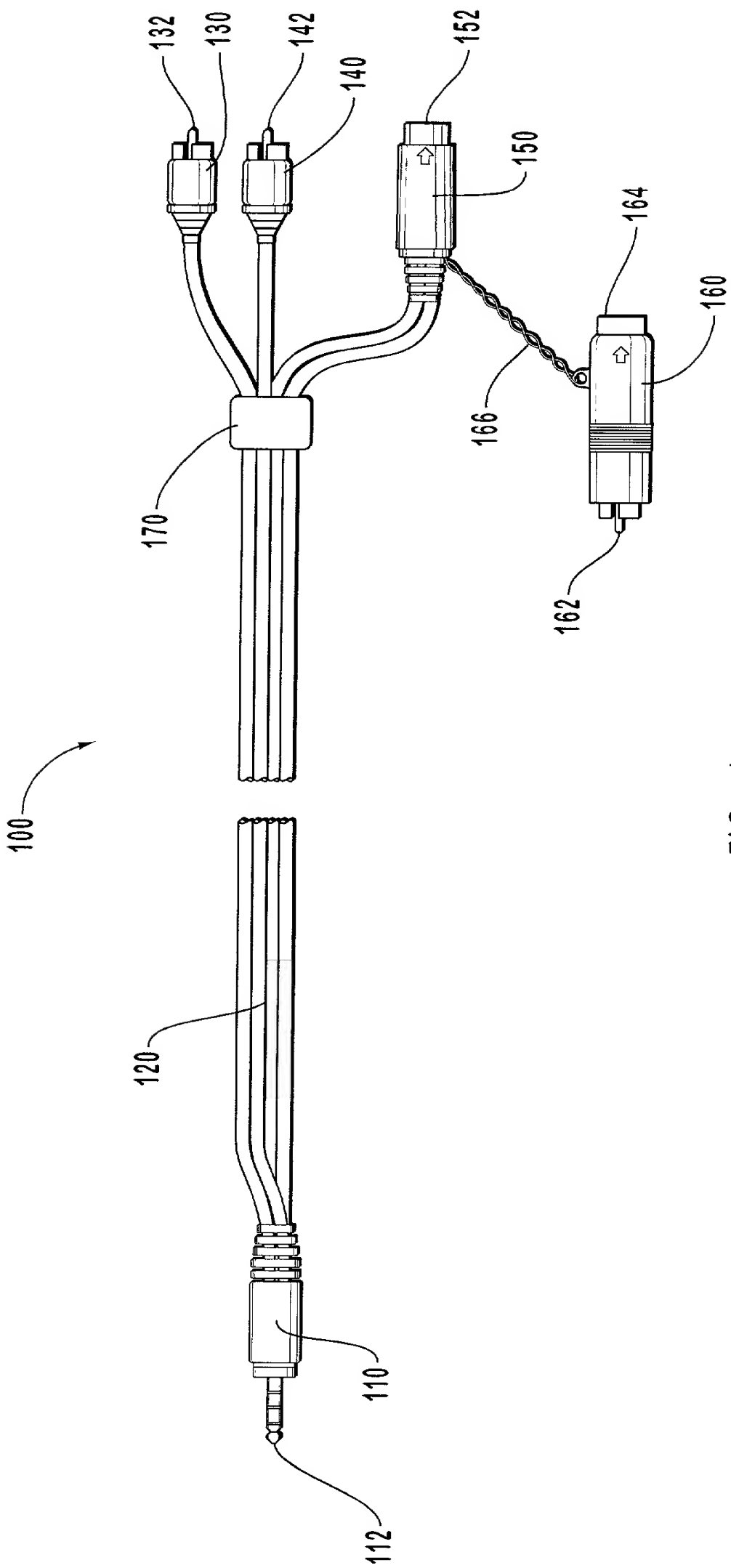


FIG. 1

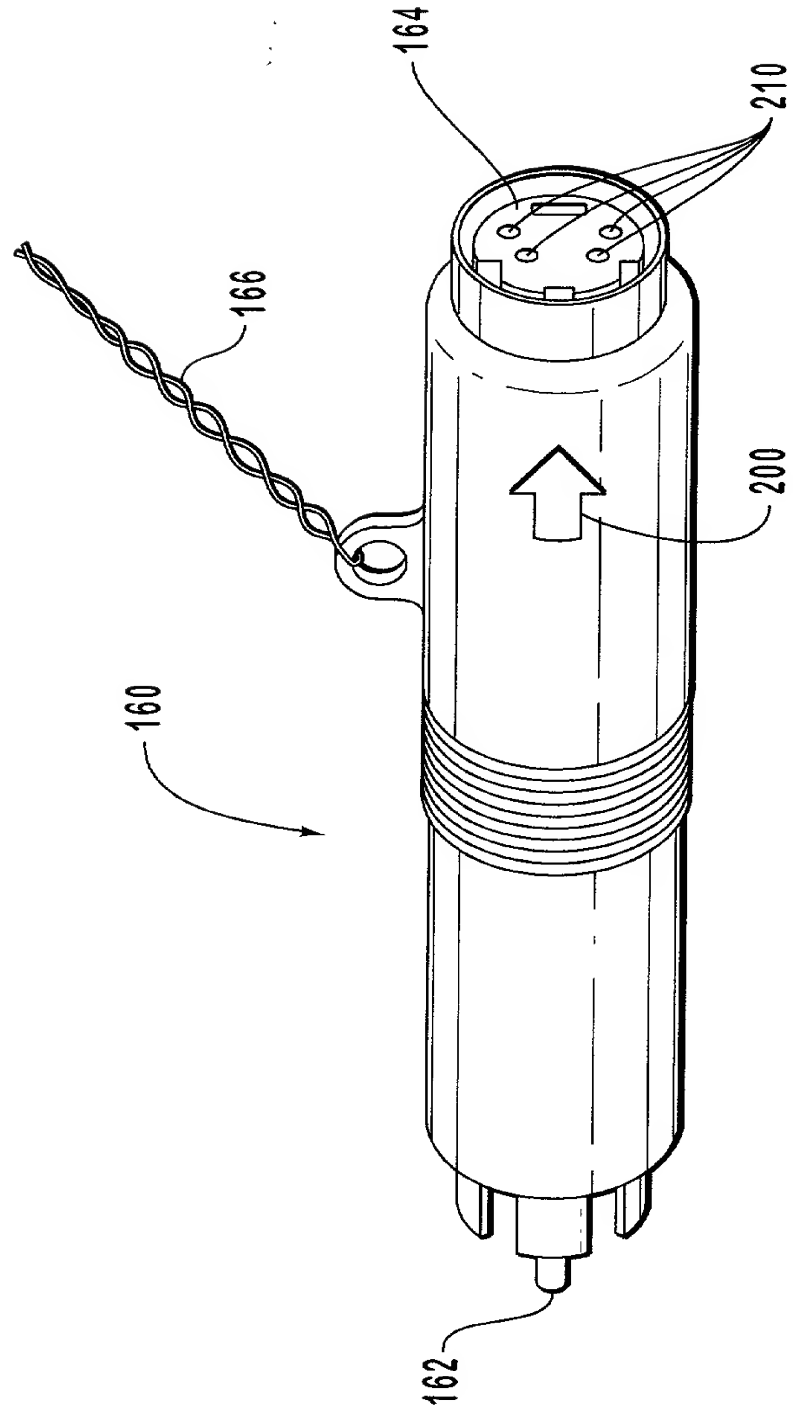


FIG. 2

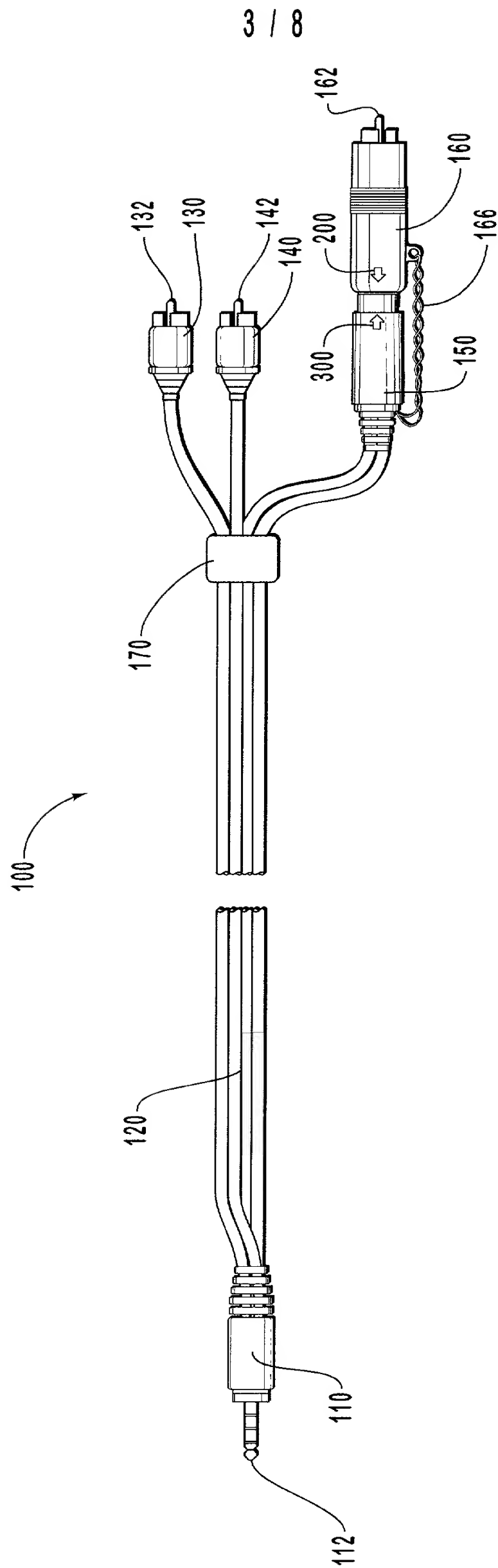


FIG. 3

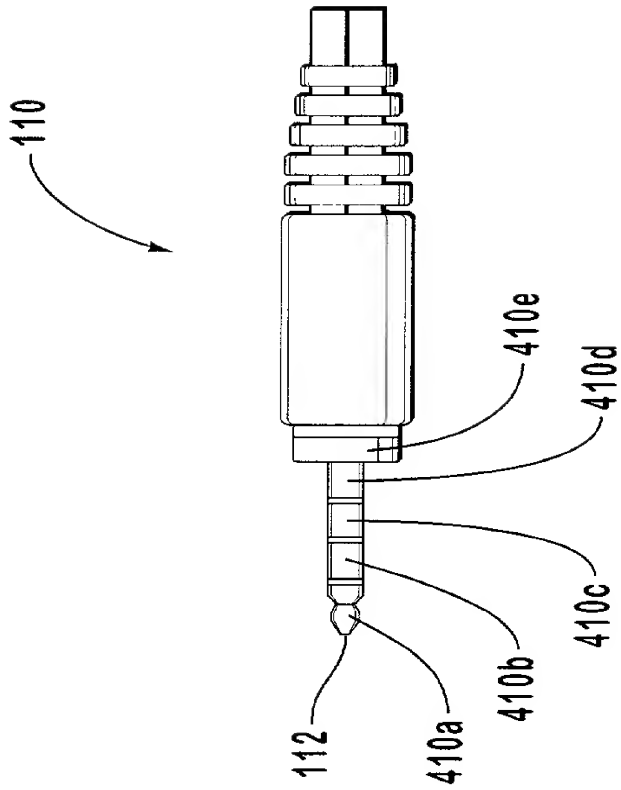


FIG. 4

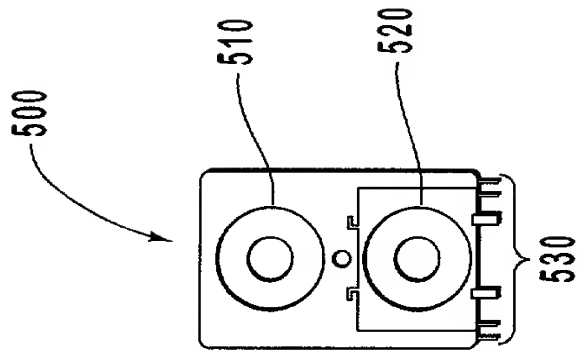


FIG. 5

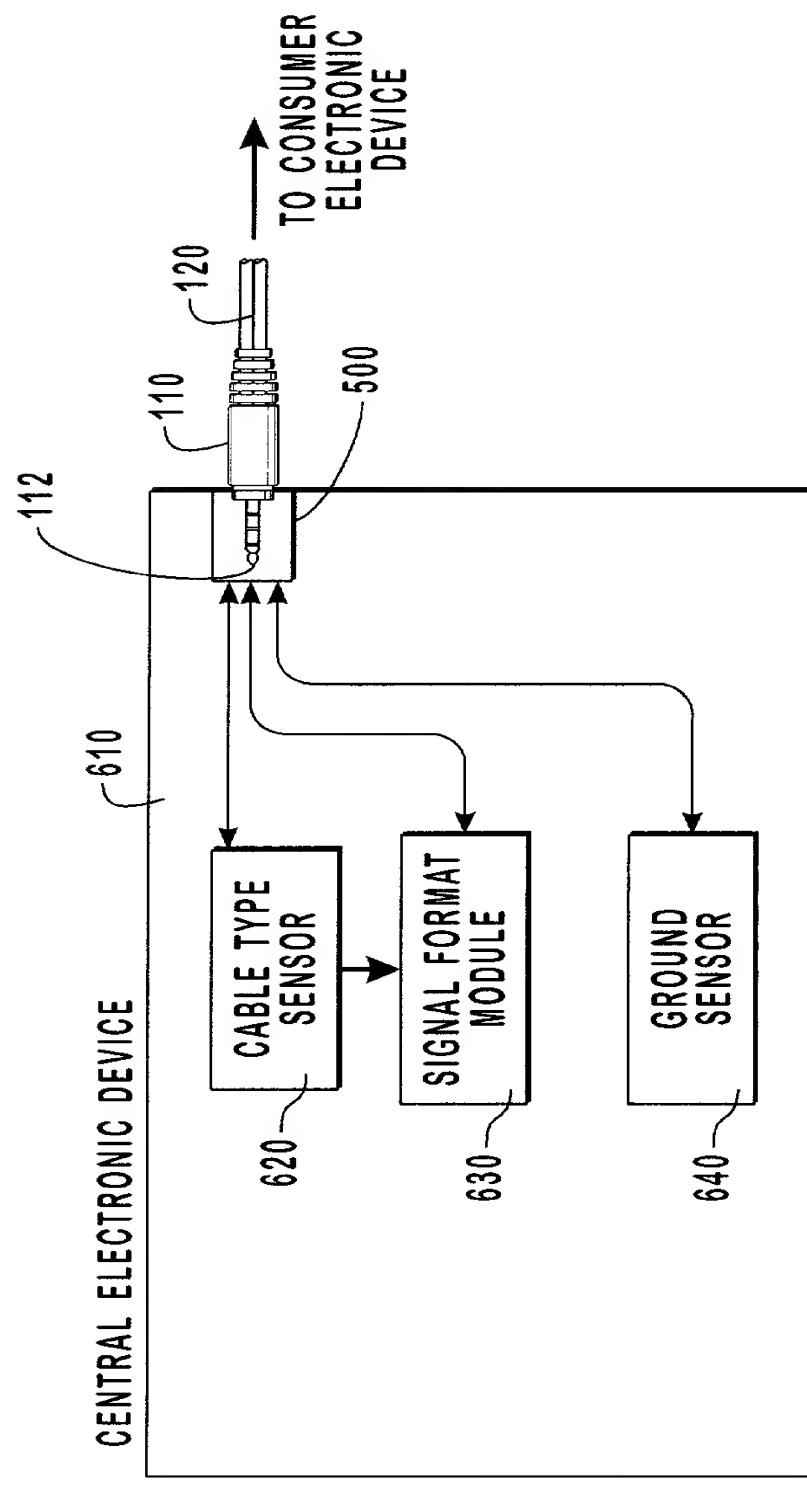


FIG. 6

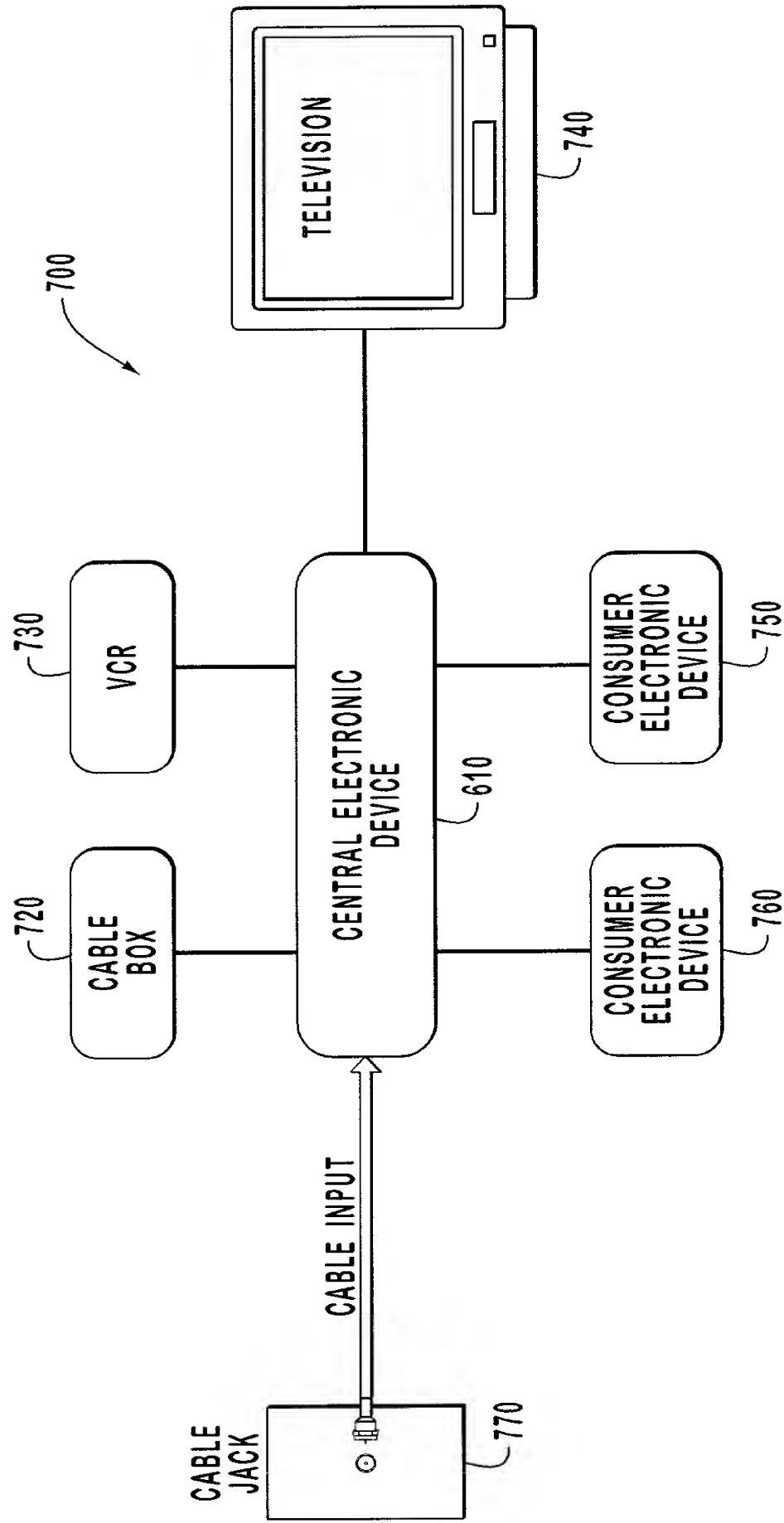


FIG. 7

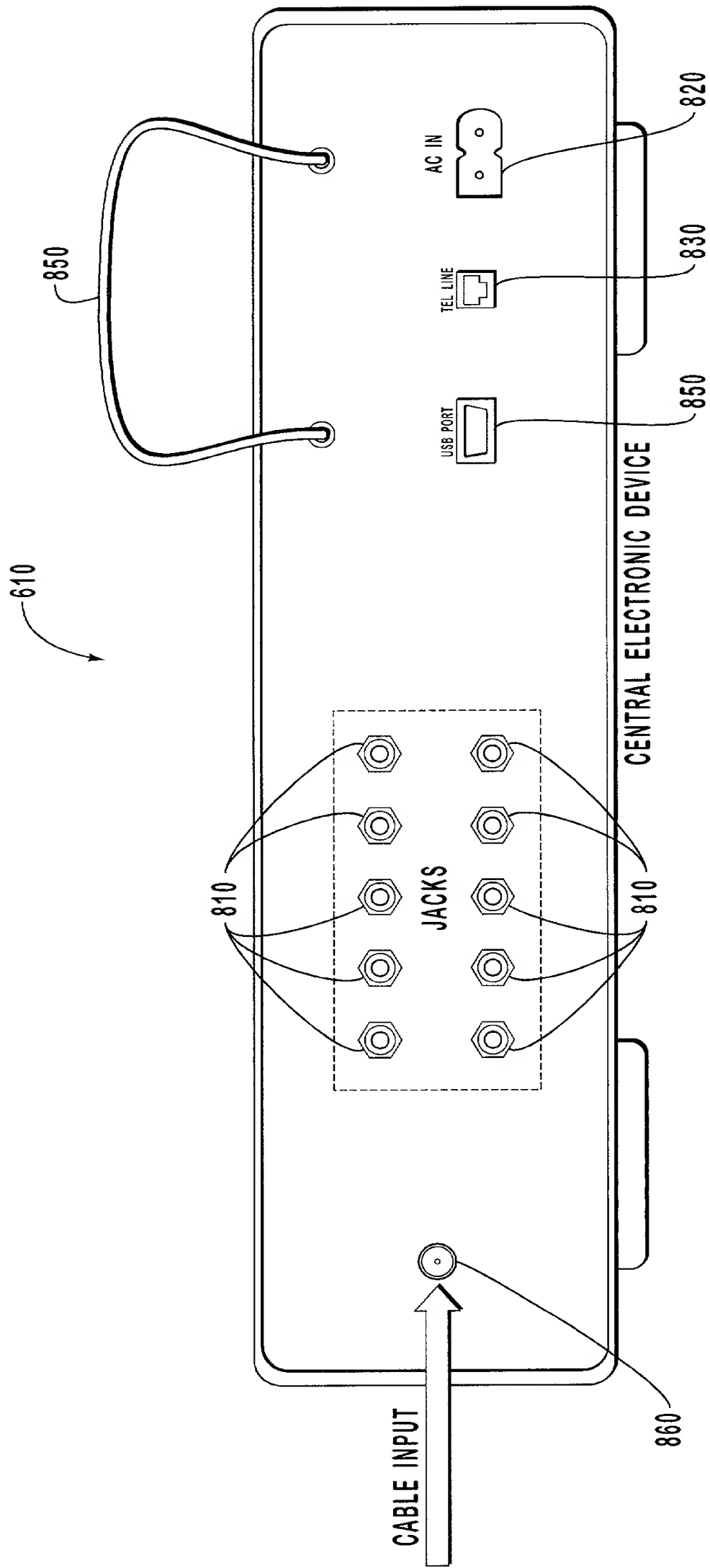


FIG. 8

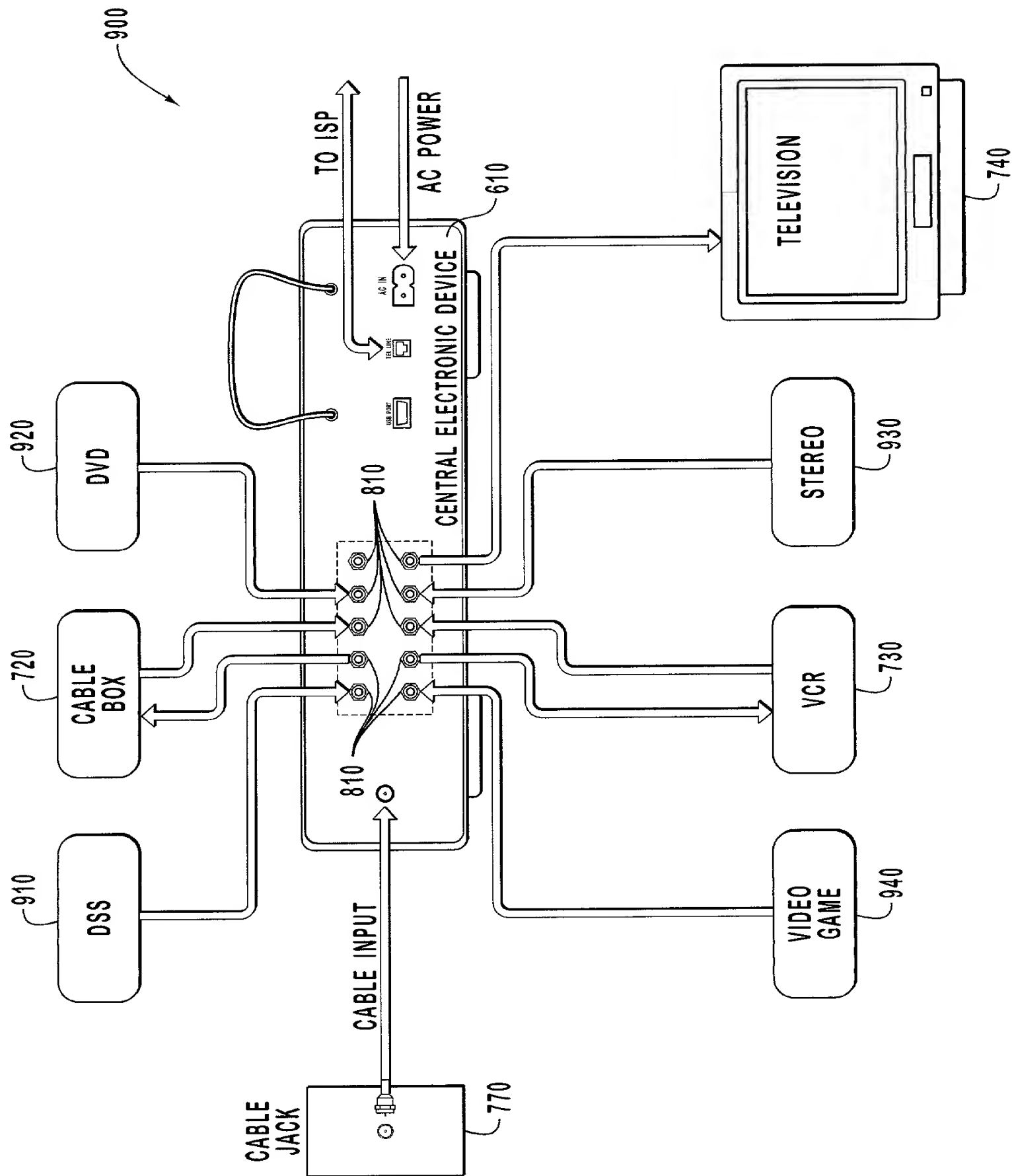


FIG. 9

Express Mailing Label No: EL 400 136 450 US

PATENT APPLICATION

Docket No: 14531.27.2.1

DECLARATION, POWER OF ATTORNEY, AND PETITION

we, Douglas Alexander of 321 Blakewood, Woodside, CA 94025; Tim Bucher of 1230 Brentwood Street, Los Altos, CA 94024, and Stephen G. Perlman of 1107 Hamilton Avenue, Palo Alto, CA 94301, declare: that we are citizens of the United States of America, respectively; that we verily believe we are the original, first, and joint inventors of the subject matter of the invention or discovery entitled "SYSTEM AND METHOD FOR INTERCONNECTING COMPONENTS THAT EMPLOY EITHER COMPOSITE OR S-VIDEO SIGNALS," for which a patent is sought and which is described and claimed in the specification attached hereto; and that we acknowledge the duty to disclose information which is material to the examination of this application in accordance with Section 1.56(a) of Title 37 of the Code of Federal Regulations.

We declare further that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful, false statements may jeopardize the validity of the application or any patent issuing thereon.

We hereby appoint as our attorneys and/or patent agents: RICK D. NYDEGGER, Registration No. 28,651; DAVID O. SEELEY, Registration No. 30,148; JONATHAN W. RICHARDS, Registration No. 29,843; BRADLEY K. DeSANDRO, Registration No. 34,521; JOHN M. GUYNN, CHARLES L. ROBERTS, Registration No. 32,434; Registration No. 36,153; GREGORY M. TAYLOR, Registration No. 34,263; DANA L. TANGREN, Registration No. 37,246;


ERIC L. MASCHOFF, Registration No. 36,596; KEVIN B. LAURENCE, Registration No. 38,219; 39,780, ROBYN L. PHILLIPS, Registration No. 39,330; DAVID B. DELLENBACH, Registration No. 39,166; KEVIN K. JOHANSON, Registration No. 38,506; JOHN N. GREAVES, Registration No. 40,362; C.J. VEVERKA, Registration No. 40,858; JOHN C. STRINGHAM, Registration No. 40,831; R. BURNS ISRAELSEN, Registration No. 42,685; DAVID R. TODD, Registration No. 41,348; JESÛS JUANÓ S i TIMONEDA, Registration No. 43,332; STEPHEN D. PRODNUK, Registration No. 43,020; R. PARRISH FREEMAN, JR., Registration No. 42,556; KYLE H. FLINDT, Registration No. 42,539; RICHARD C. GILMORE, Registration No. 37,335; and ADRIAN J. LEE, Registration No. 42,785, of WORKMAN, NYDEGGER & SEELEY, 1000 Eagle Gate Tower, 60 East South Temple, Salt Lake City, Utah 84111; and DANIEL D. CROUSE, Registration No. 32,022; and KATIE SAKO, Registration No. 32,628, of MICROSOFT CORPORATION, One Microsoft Way, Redmond, Washington 98052, with full power to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

All correspondence and telephonic communications should be directed to:

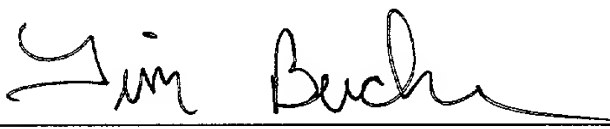
Rick D. Nydegger
WORKMAN, NYDEGGER & SEELEY
1000 Eagle Gate Tower
60 East South Temple
Salt Lake City, Utah 84111

Wherefore, we pray that Letters Patent be granted to us for the invention or discovery described and claimed in the foregoing specification and claims, declaration, power of attorney, and this petition.

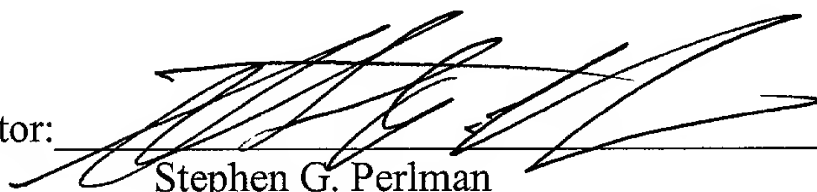
Signed at Mountain View, California, this 11 day of JAN, 2000.

Inventor: 
Douglas Alexander
321 Blakewood
Woodside, CA 94025

Signed at Mountain View, California, this 21 day of January, 2000.

Inventor: 
Tim Bucher
1230 Brentwood Street
Los Altos, CA 94024

Signed at Mountain View, California, this 14th day of January, 2000.

Inventor: 
Stephen G. Perlman
1107 Hamilton Avenue
Palo Alto, CA 94301